METHOD OF SETTING A WEB CAMERA MODE FOR A PORTABLE COMPOSITE DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of Korean Patent Application No. 2003-19250, filed on March 27, 2003, in the Korean Intellectual Property Office, the entire contents of which are incorporated herein by reference.

BACKGROUND

Field of the Invention:

The present invention relates to a portable composite device, and more particularly, to a method of setting a web camera mode for a portable composite device capable of using as a web camera the portable composite device, which has a multitude of functions including those of a camcorder, a digital camera, an MP3 player, a voice recorder, among others, and can compress and store video/audio signals using a hard disc drive (HDD) as an internal storage medium.

Description of the Related Art:

A portable composite device is a miniaturized device which can incorporate the functions of a camcorder, a digital camera, an MP3 player, a voice recorder, a data storage device, a web camera, among others, for example, and which can be carried by a user. Since the size of the portable composite device is small, it can be used in place of a web camera that is used in a personal computer.

FIG. 1 is a view illustrating the use of a conventional portable composite device as a web camera.

As illustrated in FIG. 1, the portable composite device 10, which is typically placed on an upper part of a monitor 20, acquires an image of a user 40 located in front of the monitor 20, and provides a signal of the acquired image to a personal computer (PC) 30. The portable composite device 10 has a universal serial bus (USB) interface for data transmission with the PC 30, and a setting key unit 13 for compensating and adjusting the image of the user 40 being displayed on the monitor 20 through the USB interface. The setting key unit 13

includes keys 13a, 13b and 13c that are used for setting a focus on an object, setting an image pickup mode of the portable composite device to a wide-angle mode, and adjusting color temperature of the image of the object picked up by the portable composite device. In the situation in which the conventional portable composite device 10 is used as a web camera, the environment should be manually set through the setting key unit 13 provided in the portable composite device 10. Accordingly, in order to use the conventional portable composite device 10 as a web camera, a zoom position setting and a focus adjustment should be performed through the adjustment of a lens 12 of the portable composite device 10 placed on the upper part of the monitor 20, and then the color temperature should be adjusted. This procedure is complicated in comparison to the use of a dedicated web camera of the PC 30. A method of adjusting the focus and color temperature has been proposed, which is performed by a program installed in the personal computer 30, for remotely controlling the portable composite device 10, According to this method, however, the setting is performed by manipulating a mouse or a keyboard on a control menu displayed on the monitor 20 according to a remote control program, and it therefore takes a long time to properly set the portable composite device 10. By comparison, the dedicated web camera that can be attached to the upper part of the monitor and then directly used takes less time to properly set up. It is therefore inconvenient to use the portable composite device 10.

SUMMARY OF THE INVENTION

An aspect of the invention is to solve at least the above-identified problems and/or disadvantages and to provide at least the advantages described hereinafter.

Another aspect of the present invention is to provide a portable composite device and a method of setting a web camera mode for the portable composite device that can reduce the setting time when using the portable camcorder operating as the portable composite device as a web camera.

To achieve the above aspects and/or other features of the present invention, there is provided a method of setting a web camera mode for a portable composite device having an interface connectable with a personal computer and a zoom lens, which comprises the steps of determining whether the present mode is a web camera mode in which the personal computer is connected to the interface and the device is used as a web camera, and if the present mode is determined to be in the web camera mode, setting the zoom lens to a wide-angle mode on the basis of a preset value.

Further provided is the step of providing an image signal corresponding to an image picked up by the zoom lens set to the wide-angle mode to the personal computer through the interface.

A further aspect of the present invention is that the step of setting the zoom lens to the wide-angle mode can include the step of setting the color temperature of the image signal to a specified color temperature.

Additionally, the step of setting the color temperature can include the step of calculating a color temperature difference between the preset color temperature and a color temperature of the image signal, and compensating for the preset color temperature according to the calculated color temperature difference. The step of setting the zoom lens to the wide-angle mode can include the step of driving the zoom lens in the wide-angle mode by adjusting a focal distance of the zoom lens. The step of setting the zoom lens to the wide-angle mode can further include the step of setting the focal distance of the zoom lens to a specified distance. The step of setting the focal distance to the specified distance can include the step of calculating a distance difference between the zoom lens and an object based on a preset value, and compensating for the focal distance of the zoom lens according to the calculated distance difference. The method can further comprise the step of releasing a setting of the wide-angle mode if the personal computer is disconnected from the interface. The determining step can include the step of determining whether the portable composite device is used in a mass storage mode for setting the device to a mobile storage device, and if the device is used in the mass storage mode as a result of the determination, transmitting video/audio data stored in the portable composite device to the personal computer through the interface.

In another aspect of the present invention, there is provided a portable composite device which comprises an image pickup unit for performing a photoelectric conversion of an optical image taken through a zoom lens and outputting a corresponding electric signal, an NTSC/PAL decoder for converting a standard television signal into digital data to output the digital data, a storage medium for storing the digital data, an NTSC/PAL encoder for converting an input digital data into a standard television signal to output the television signal, and a control unit for converting the electric signal outputted from the image pickup unit into digital data. The portable composite device further comprises a compressing and storing in the storage medium the converted digital data and the data outputted from the NTSC/PAL decoder, and generating a mode selection signal for selecting one of the data

stored in the storage medium and the digital data corresponding to the electric signal output from the image pickup unit, and a switching unit for switching and outputting one of the digital data stored in the storage medium and the digital data corresponding to the electric signal to a serial port through a serial interface in response to the mode selection signal.

In still a further aspect of the present invention, the control unit sets a position of the zoom lens included in the image pickup unit to a wide-angle mode on the basis of a preset value in response to an external control signal. Further still, the control unit makes the digital data corresponding to the electric signal have a preset color temperature value in response to the external control signal. In one particular exemplary embodiment of the present invention, the color temperature value can be set at or about 4500° K. Additionally, the switching unit outputs the digital data stored in the storage medium (which generally is a hard disk drive) to the serial port through the serial interface when the mode control signal is in a first logic level, and outputs the digital data corresponding to the electric signal to the serial port through the serial interface when the mode control signal is in a second logic level.

BRIEF DESCRIPTION OF THE DRAWINGS

The above aspects and other advantages of the present invention will become more apparent by describing in detail a preferred embodiment thereof with reference to the attached drawings in which:

FIG. 1 is a view illustrating the use of a conventional portable composite device as a web camera;

FIG. 2 is a perspective view of a portable composite device according to an embodiment of the present invention;

FIG. 3 is a view illustrating an inner structure of a lens unit illustrated in FIG. 2;

FIG. 4 is a block diagram of the portable composite device according to an embodiment of the present invention;

FIG. 5 is a flowchart illustrating a web camera mode setting method for a camcorder as the portable composite device according to an embodiment of the present invention;

FIG. 6 is a flowchart illustrating the process of step S300 in FIG. 5; and

FIG. 7 is a flowchart illustrating the process of step S500 in FIG. 5.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A portable composite device and a method of setting a web camera mode for a portable composite device according to the present invention will be now described in detail with reference to the annexed drawings in which like reference numerals refer to like elements.

FIG. 2 is a perspective view of a portable composite device according to an embodiment of the present invention.

As shown in FIG. 2, the portable composite device according to an embodiment of the present invention includes a lens unit 60 installed on an upper surface of a main body 65 and having focal distance adjustment and zoom functions to perform image acquisition, and an LCD monitor 70, rotatably connected to the main body 65, for reproducing the acquired image and sound. The LCD monitor 70 is also used as a view finder for the object being presently photographed.

On a rear surface of the main body 65, a manipulation unit 80 is provided, which includes a switch for controlling the operation of the device. The manipulation unit 80 is provided with a USB interface terminal 81 for applying the image signal acquired by the lens unit 60 to the personal computer (not illustrated), and a mode setting key 82 for setting the portable composite device to a web camera mode when the personal computer is connected to the USB interface terminal 81.

FIG. 3 is a view illustrating an inner structure 50 of the lens unit structure 60 illustrated in FIG. 2.

As shown in FIG. 3, the lens unit structure 60 includes a first lens group 51, a second lens group 52, a third lens group 53, a fourth lens group 54, and a charge coupled device (CCD) for performing a photoelectric conversion of an optical image incident through the fourth lens group 54. The first or fourth lens group 51 or 54 is composed of a combination of one or at least two lenses having a positive refractive index, and is fixedly arranged. The second lens group 52 is composed of two lenses 52a and 52b having a negative refractive index, and driven by a motor to move toward the first lens group 51 and the third lens group 53. If the second lens group 52 moves toward the first lens group 51, the zooming ratio is decreased, while if it moves toward the third lens group 53, the zooming ratio is increased.

The fourth lens group 54 is composed of a combination of one or two lenses having a positive refractive index, and focuses on the incident optical image according to the

zooming ratio set by the first lens group 51, the second lens group 52 and the third lens group 53 as it is driven by a motor to perform a rectilinear motion.

FIG. 4 is a block diagram illustrating the internal construction of the portable composite device according to the present invention.

The portable composite device according to an embodiment of the present invention includes a lens unit 50, a CCD 100, an LCD driver 105, an NTSC/PAL encoder 110, an NTSC/PAL decoder 115, a timing generation/correlated double sampler/auto gain control (TG/CDS/AGC) 120, a lens driving unit 125, a mode control unit 130, a function block unit 140, a flash memory 145, an audio interface unit 155, a USB unit 160, a transition integrated circuit (TIC) 165, an HDD 170, an synchronous dynamic random access memory (SDRAM) 175, and a control unit 200.

The lens unit 50 has the structure as illustrated in FIG. 3, and focuses on the optical image obtained from the object or varies the zooming ratio.

The CCD 100 converts the optical image incident through the lens unit 50 into an electric signal and outputs the electric signal. The optical image of the object is formed on an optical surface of the CCD 100 by the lens unit 50, and the CCD 100 converts the optical image formed on its photosensitive surface into the electric signal, and outputs the electric signal in the form of a one-dimensional electric signal by means of a horizontal and vertical scanning.

The LCD driver 105 is used to drive the LCD monitor 13. The NTSC/PAL encoder 110 converts the signal outputted from the control unit 200 into an image signal of an National Television System Committee (NTSC) or phase alternation line (PAL) () system. The NTSC/PAL decoder converts the signal of the NTSC or PAL system input through a video line input terminal into digital data, and outputs the digital data to the control unit 200. Both the NTSC and PAL systems are standardized television output systems. The NTSC system is used in both Korea and the United States of America, and the PAL system is used in Europe and elsewhere (e.g., Israel).

The TG/CDS/AGC 120 removes noise from the signal output from the CCD 100 using a correlated double sampling circuit, and transfers the signal that has passed through an automatic gain control circuit to the control unit 200. The lens driving unit 125 drives the lens unit 50 so as to control the focus and an iris of the lens unit 50. When the portable composite device according to an embodiment of the present invention is used as a web camera in association with the personal computer, the lens driving unit 125 receives preset

values for setting a focal distance and a wide angle, for example, a positional value of the second lens group 52 and a positional value of the fourth lens group 54, and controls the lens group 50 according to the received positional values. The focal distance is typically set to 1 meter and less (for example, 60 cm) in consideration of the distance between the monitor provided in the personal computer and a user. A wide-angle mode for reducing the size of the image and widening the angle of view is set by moving the second lens group 52 of the lens unit 50 toward the first lens group 51 for a preset distance.

The mode control unit 130 controls the driving of the LCD driver 105 and the lens driving unit 125 according to the mode selected by the user. If a web camera mode PC is set by the mode setting key 82, the mode control unit 130 receives the preset value stored in the flash memory 145 from the control unit 200, and provides the set value to the lens driving unit 125.

The function block unit 140 stores information regarding operation states selected by a user's manipulation of the manipulation unit 80, and transfers the information to the mode control unit 130, so that the mode control unit performs the corresponding operation state.

The flash memory 145 stores system programs required for operating the device such as a booting program, application programs, and other important data that should be kept even if the power is cut off. The flash memory also stores preset values required when the portable composite device operates as a web camera.

The audio interface unit 155 performs the function of interfacing for the input/output of an external audio signal and for the driving of audio devices such as a headphone, a microphone, and other devices. The USB unit 160 is a serial port, and provides a plug-and-play interface between the computer and peripheral devices such as an audio player, a printer, among others.

The TIC 165 is used for signal matching between the control unit 200 and the HDD 170, and the HDD 170 stores data compressed by the control unit 200. The HDD 170 can be a one-inch HDD that is useful in miniaturization of the device. The SDRAM 175 serves as a buffer that stores data required for operation of the device.

The control unit 200 converts the signal input from the TG/CDS/AGC 120 into digital data, compresses the converted data and data input from the NTSC/PAL decoder 115, the audio interface unit 155 and the USB unit 160, and stores the compressed data in the HDD 170 through the TIC 165. The control unit 200 also decompresses and outputs the data

stored in the HDD 170 to the NTSC/PAL encoder 110 or the audio interface unit 155 during the reproduction of the video/audio signals stored in the HDD 170. In addition, the control unit 200 controls the entire operation of the device.

If the web camera mode PC is set by the mode setting key 82, the control unit 200 receives set values through the mode control unit 130, and applies a 'high'-level mode control signal to the switching unit 180. If the mass storage mode is set by the mode setting key 82, the control unit 200 applies a 'low'-level mode control signal to the switching unit 180.

The switching unit 180 outputs either the digital data from the control unit 200 or the digital data from the HDD 170 to the USB unit 160 in response to the mode control signal. In the case that the mode control signal applied to the switching unit 180 is 'high' (the web camera mode PC), the switching unit 180 outputs the digital data stored in the TG/CDS/AGC 120 to the USB unit 160, while in the case that the mode control signal is 'low' (the mass storage mode), it outputs the digital data output from the HDD 170 to the USB unit 160. Accordingly, if the web camera mode PC is set by the mode setting key 82, the switching unit 180 makes the digital image signal, which corresponds to the electric signal output from the TG/CDS/AGC 120, output to an outside device (for example, personal computer) through the USB unit 160. Also, the switching unit 180 makes the image pickup mode set to the wide-angle mode by driving the lens unit 50 according to the preset value stored in the flash memory 145. Accordingly, the personal computer 30, which can be connected to the portable composite device through the USB interface 81, receives the digital image signal and displays the image on the monitor 20. If the mass storage mode is set by the mode setting key 82, the switching unit 180 applies the digital data stored in the HDD 170 to the personal computer through the USB interface, and thus the HDD 170 can be used as a mobile storage device. If the mass storage mode is selected by the mode setting key 82, the driver program stored in the flash memory 145 is loaded to the control unit 200, and thus the HDD 170 can be used as a mobile disc.

FIG. 5 is a flowchart illustrating a web camera mode setting method for a camcorder as the portable composite device according to a preferred embodiment of the present invention.

The method according to the preferred embodiment of the present invention begins by determining whether the camcorder and the personal computer 30 are connected together through the USB interface (decision step S210). The portable composite device according to

the embodiments of the present invention has two types of transmission modes. One is a mass storage mode for loading the video/audio data stored in the HDD 170 built in the camcorder to the personal computer, and the other is a web camera mode for using the web camera of the personal computer by applying an optical image received through the lens unit 50 of the camcorder to the personal computer. In the mass storage mode that is set by moving the mode setting key 82 toward a mark "PC", the personal computer recognizes the HDD 170 built in the camcorder as a mobile storage device ("Yes" path from decision step S210; decision step S220). If the camcorder is set to the mass storage mode ("No" path from decision step S220; decision step S400), a driver program is loaded from the flash memory 145 to the control unit 200. This driver program is used to make the personal computer recognize the HDD 170 provided in the camcorder as a mobile storage device.The personal computer that has an operating system such as WINDOWS can then access the video/audio signal stored in the HDD 170 ("Yes" path from decision step S400; step S410). If, however, the web camera mode PC is set by the mode setting key 82 ("Yes" path from decision step S220; step S300), the optical image is received according to the focal distance (for example, 60 cm) and the image pickup mode (for example, wide-angle mode) set by the second lens group 52 and the fourth lens group 54, the positions of which are changed according to the preset values stored in the flash memory 145.

The control unit 200 sets the color temperature of the optical image incident through the lens unit 50 at or about 4500° K (S500). The color temperature of 4500° K corresponds to an illumination value under a fluorescent light, and this enables the user to directly use the web camera without the necessity of a separate lens and color temperature settings by means of a setting key attached to the web camera when the user uses the camcorder as the web camera. In the camcorder, the energy distributions of R, G and B are changed according to the color temperature, and the control of the color temperature, which is typically called a white balance adjustment, is performed by adjusting an optical or electric gain so that the energy distributions of R, G and B per wavelength become uniform. Since human eyes are well adapted for the surrounding light sources, the color temperature value should be adjusted so that the human eyes always sense natural colors. In the case of using the camcorder as a web camera, the color temperature of about 4500° K is set according to the indoor illumination condition, and this prevents a red light or a blue light of the image displayed on the monitor from being emphasized.

Finally, by setting the color temperature, the image pickup mode (for example,

wide-angle mode), and the focal distance as described above, the user can directly use the camcorder mounted on the monitor as a web camera without any separate setting work.

FIG. 6 is a flowchart illustrating the process of step S300 in FIG. 5.

The process of step S300 begins with the control unit 200 loading the preset values of the focal distance and the image pickup mode of the camcorder from the flash memory 145, and applying the preset values to the mode control unit 130. The mode control unit 130 controls the second lens group 52 and the fourth lens group 54 by driving a stepping motor (not illustrated) provided in the lens unit 50 according to the applied preset values (step S310). If the distance between the monitor and the user exceeds 60 cm while the focal distance is set to 60 cm, the image displayed on the monitor is unclear (i.e., out-of-focus). If it is assumed that the distance between the monitor and the user does not exceed 1 meter, the amount of driving the stepping motor must perform, as it is controlled by the lens driving unit 125, becomes very small. The control unit 200 calculates the distance from the object (i.e., user) based on the preset focal distance (for example, 60 cm), and the calculated distance value is applied to the lens unit 50 via the mode control unit 130 and the lens driving unit 125 to drive the lens unit 50 (step S320). Since there is no significant difference between the focal distance to be adjusted corresponding to the amount of driving the stepping motor provides to the lens unit 50, and the preset focal distance of the camcorder, prompt adjustment of the focal distance can be achieved.

FIG. 7 is a flowchart illustrating the process of step S500 in FIG. 5.

The process of step S500 begins when the color temperature value of 4500° K stored in the flash memory 145 is applied to the control unit when the camcorder is set to the web camera mode by the mode setting key 82 provided in the camcorder. Then, the control unit 200 determines the color temperature of the image applied to the lens unit 200 (step S520). The control unit 200 compares the color temperature value of the image incident through the lens unit 50 with the preset value of 4500° K to determine the difference between the color temperature values (step decision step S530).

If the color temperature value of the image incident through the lens unit 50 is not equal to the preset value of 4500° K ("no" path from decision step S530), the control unit 200 then compensates for the color temperature value as much as the determined difference (step S540). Since the web camera is typically used under the illumination condition of a fluorescent light, it is not required to compensate for the color temperature value unless an incandescent light is used. Even in the case of compensating for the color temperature, such

compensation is performed quickly in comparison to the case that no color temperature value is set in the camcorder.

As described above, in accordance with the embodiments of the the present invention, the setting time can be reduced without the necessity of the user's separate manipulation of the settings when a portable composite device such as a camcorder is used as a web camera in association with the personal computer.

While the present invention has been described in detail, it should be understood that various changes, substitutions and alterations can be made hereto without departing from the spirit and scope of the invention as defined by the appended claims.